1 **Factors predicting the oral health behaviors of the Iranian students in the**

2 **District 1 Tehran, Iran.**

3 **Short running: oral health prediction**

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35

36    Abstract

37    **Aim:** The purpose of this examination is determining predictors to oral health behaviors predict in Iranian

38    students in district 1 Tehran based on the health belief model with added commitment to plan construct.

39    **Methods:** This cross-sectional study were randomly selected conducted on 351 eligible four grade female

40    students in the first district of Tehran, Iran in 2017. The random Multi-stage random cluster sampling

41    method was used to recruit students. The inclusion criteria were being graded, four female students (aged

42    9-11 years), or education at the fourth grade of one of the elementary schools studied in the first district of

43    Tehran and, The health of the student from a physical and psychological of view. Logistic regression

44    analysis was used to identify the variables that predict oral health behaviors. To assess the predictors of

45    oral health behaviors, all the expanded Health Belief Model constructs with the construct of

46    "Commitment to Plan of Action" from "Health Promotion Model were examined as risk factors to see if

47    they influence on the probability of brushing behavior and dental floss behavior occurrence and were

48    interpreted through odds ratio (OR). SPSS version 19 was used to analyze the data.

49    **Results:** Totally 308 four grade female students with mean age of $9.32 \pm 0.81$ years old took part in the

50    study. The total 31.8% of the students reported that they were brushing behavior less than twice a day and

51    55.2% students claimed, use of dental floss behavior once a week or less than once a day. The results

52    indicated that perceived self-efficacy (OR=1.46, 95% CI=0.57-3.78, P<0.001), Commitment to plan

53    (OR=1.13, 95% CI=1.04-1.23, P<0.001) and Cues to action (OR=1.42, 95% CI=1.14–1.76, P=0.002)

54    were the significant predicting variables which is the key factor of brushing twice a day, and use of dental

55    floss once a day or more (OR=1.02, 95% CI=0.23-3.53, P=0.003).

56    **Conclusion:** This study has shown the effectiveness of the health belief model with added commitment to

57    plan construct to predict oral health behavior in female students. So, it seems that the model as a

58    framework for designing training programs to improve students to improve oral health behavior can be

59    used.

60    **Key words:** Oral Health; Students, Medical, Behavior, Iran.

61

## Introduction

Oral disorders are the most common health problems. Studies have shown that one of the commonest problems of early life is dental caries and oral diseases. Oral health is a part of the public health and essential to enhancing the quality of life[1]. Primarily based on the precept that prevention and training are the satisfactory manners of promoting oral health collectively, that extra prematurely preventive measures and interruption on disease evolution are established more effective might be the results[2].

Distribution and severity of oral conditions vary in different components of the world and this is also real for specific geographic conditions within the equal country or area[3]. According to a countrywide oral health survey performed in 2012, indicated a high level of carries inside the primary dentition and the mean DMFT index become pronounced with 5.16/0.38 in 6-year-old children[4].

Behavior elements and factors are received in early childhood and there is a strong mother or care. There is the fact that habits are at this age and caries in the first teeth[2]. Brushing and flossing are the very best methods to reduce the incidence of plaque[5].

In addition, health education is considered a critical method for health promotion, now not best by the impact and voluntary wonderful adjustments within the individual's way of life and health habits; additionally, it improves familiar and community behavior, producing political behaviors that allow the development of new strategies to promote health and enhance the quality of lifestyles of the populace[2, 6]. The implementation and effectiveness of educational preventive programs have become relevant because of the interception of risk factors for oral diseases, knowledge acquisition and consequently behavioral changes[6].

In health education; the use of models and theories of health behavior to interventions is recommended because they can cause powerful health education programs. In fact, the models

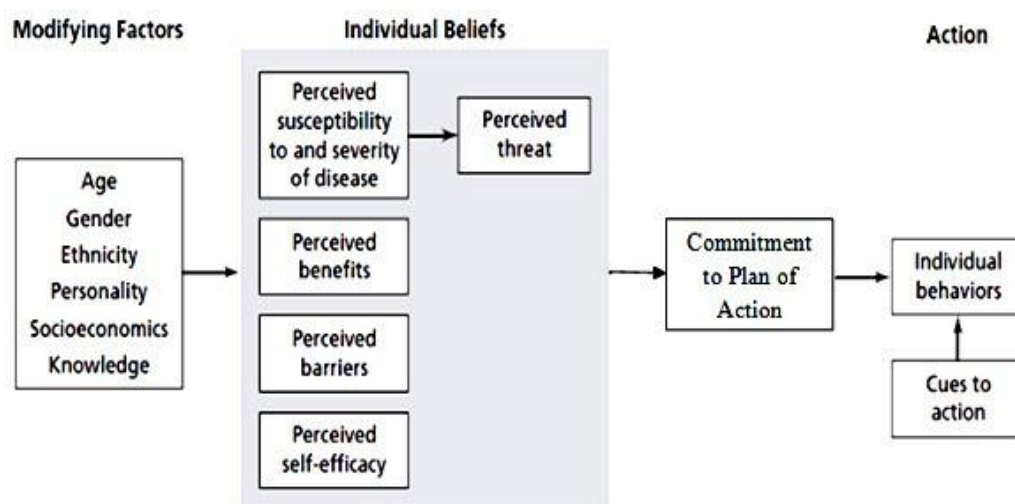
86    provide a framework for expertise on how people analyze and the way they behave and why

87    humans behave as they offer[7]. The Health Belief model method is a comprehensive model that

88    can be used for organizing educations. The HBM is a number of the first models which were

89    advanced for regulating health-related behaviors[8]. On this version there are specific patterns of

90    social-cognitive predictors can also appear (Figure 1) the construct of "Commitment to Plan of

91    Action" from "Health Promotion Model Added to HBM model.

92

93    **Figure 1.** Flow Diagram of the expanded Health Belief model with the construct of "Commitment to Plan of
94    Action" from "Health Promotion Model.

95

96    The model assumes that different factors, consisting of the perceived severity of health trouble,

97    perceived benefits, and perceived barriers preventing people from assignment preventive

98    behaviors, affect health related beliefs and behaviors[9]. The purpose of this examination is

99    determining predictors to oral health behaviors example teeth brushing frequency, dental floss frequency

100   and in Iranian students in district 1 Tehran based on the health belief model with added commitment to

101   plan construct.

102

103   **Materials and methods**

104   Study design and participants

105   The study was cross-sectional, which was conducted on the grade four female students (9-11

106   years) of schools in the first district of Tehran on April 21, 2017, for 2 months. To obtain

107   samples from among the 33,179 female students (grade four) studying in this Urban-rural, a

108   Multi-stage random cluster sampling method was used.

109   In the first stage, out of 162 schools (145 urban schools and 17 rural schools), 10 schools [Urban

110   schools (N=6) and Rural schools (N=4)] were randomly selected.

111   In the second stage, From 351 students with it were random Based on the share of the population

112   from each school and the number of schools and students in each school after declines 43

113   students, Assessed for eligibility (n=308) (Table 1).

114   The inclusion criteria were being graded, four female students (aged 9-11 years), or Education at

115   the fourth grade of one of the elementary schools studied in the first district of Tehran and, The

116   health of the student from a physical and psychological point of view and the exclusion criterion

117   was Student or parent's disagreement with the student company in the study and, the student

118   determines the confrontation with their company in the study, the selected students were asked to

119   respond to the study questionnaire.

120   The researcher was present while completing the questionnaire to help the students. The students

121   were defined in the event that they to answer truly, this may assist the researchers to acquire the

122   right information and improve knowledge (Figure 2).

123   All ethical issues were considered in this study. After explaining the aims and procedures of the

124   study, all participants were satisfied to be studied and voluntarily signed the written consent

125   form. Research Ethics Committee of Shahid Beheshti University approved the study on 2016.3.5

126   (ID IR.SBMU.RETECH.REC.1396.625). Data were entered into the SPSS software version 19

127   and analyzed through Logistic regression analysis. P <0.05 was thought-out statistically

128   substantial.

129   Based on the existed reference the sample size was estimated on the basis of ten individuals for

130   each item[10]. Therefore for a 31 item questionnaire a sample size of $31 \times 10 = 310$ were

131   calculated. However, for greater accuracy, the sample size was increased to 351 individuals.

132   To assess the predictors of SE, all the oral health behaviors, all the expanded Health Belief

133   Model constructs with the construct of "Commitment to Plan of Action" from "Health Promotion

134   Model constructs (Table 2,3) were examined as risk factors which could influence the probability

135   of occurrence SE and were interpreted through odds ratio (OR). The odds ratio was used to

136   determine whether particular exposures like the above constructs could be risk factors for the

137   occurrence of the outcome like rushing behavior and dental floss behavior. Odds ratios are used

138   to predict risk factors in case-control, cross-sectional and cohort study designs[11]. SPSS version

139   19 was used to analyze the data.

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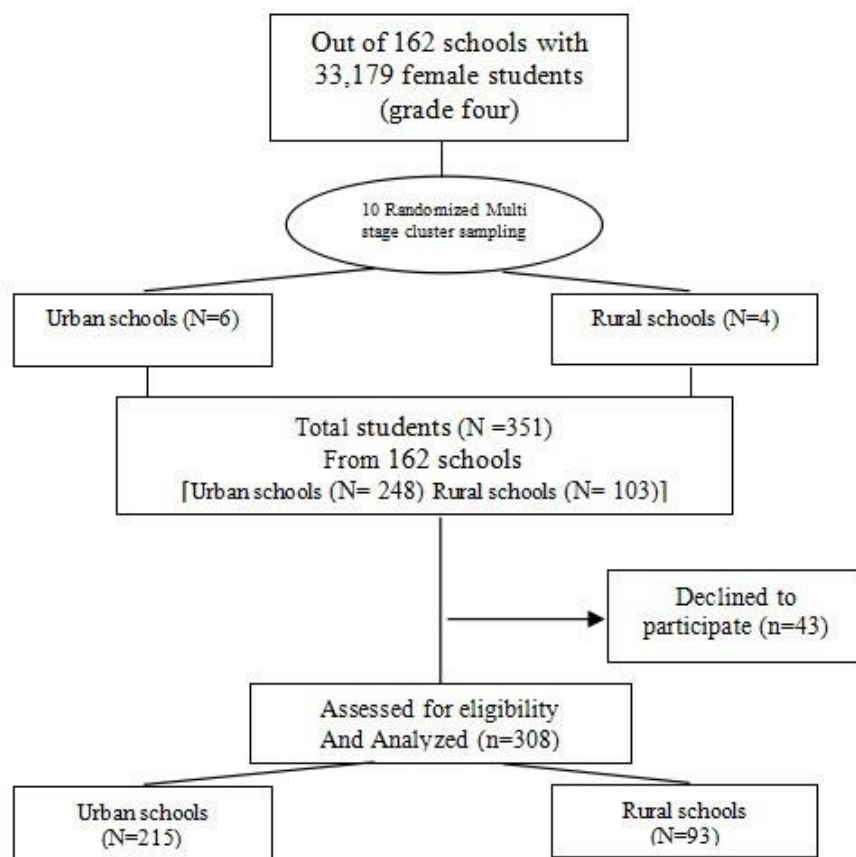
**Figure 2.** Flow diagram of student's recruitment.

## Results

Totally, 308 four grade female students in the first district of Tehran took part in the study. The mean age of the subjects was 9.32 ± 0.81 years. The demographic variables of the study population are shown in Table 1, 2. About 31.8% of the students (n =98) reported that they were brushing behavior less than twice a day, and 170 students (55.2%) reported that they used once a week or after using dental floss behavior or less than once a day. While 210 students (68.2%) reported that they brush behavior at least two twice a day, 138 students (44.8%) reported that they were using dental floss behavior at least once a day. The results indicated that perceived self-efficacy (OR=1.46, 95% CI=0.57-3.78, P<0.001), Commitment to plan (OR=1.13, 95% CI=1.04-1.23, P<0.001) and Cues to action (OR=1.42, 95% CI=1.14–1.76, P=0.002) were the

154    significant predicting variables which is the key factor of brushing twice a day, and use of dental

155    floss once a day or more (OR=1.02, 95% CI=0.23-3.53, P=0.003).

156
157                        **Table1**. Demographic characteristics affecting of the students brushing behavior
158

| Demographic variables | Brushing frequency | |
|---|---|---|
| | less than twice a day | twice a day or more |
| | N (%) | N (%) |
| | 98(31.81) | 210(68.19) |
| **Father's educational level** | | |
| Primary | 20(20.4) | 54(25.7) |
| High school | 35(35.7) | 66(31.4) |
| Higher educational | 43(43.9) | 90(42.9) |
| **P-value** | 0.03 | |
| **Mother's educational level** | | |
| Primary | 23(23.5) | 43(20.5) |
| High school | 31(31.6) | 80(38.1) |
| Higher educational | 44(44.9) | 87(41.4) |
| **P-value** | 0.07 | |
| **Father's job** | | |
| Private | 75(76.6) | 147(70) |
| Employee | 23(23.4) | 63(30) |
| **P-value** | 0.08 | |
| **Mother's job** | | |
| Un Employed | 50(51) | 110(52.4) |
| Employed | 48(49) | 100(47.6) |
| **P-value** | 0.1 | |
| **Income** | | |
| Low | 10(10.2) | 16(7.6) |
| Appropriate | 13(13.3) | 17(8.1) |
| Well | 16(16.3) | 87(41.4) |
| Excellent | 59(60.2) | 90(42.9) |
| **P-value** | 0.04 | |

184    First stage

185    The recognition of effective demographic variables on oral health behaviors using Chi-square

186    statistics. The related data are shown in Tables 1 and 2.

187    Based on the results given in Table 1, the education of mothers and Father's educational level

188    respectively (p=0.07; p=0.03), the Father's job (p=0.09), and income (P = 0.04) had a significant

189    relationship with the students' brushing behavior.

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**Table2.** Demographic characteristics affecting of the students dental floss behavior

| Demographic variables | Dental floss frequency | |
|---|---|---|
| | once a week or less than once a day | once a day or more |
| | N (%) | N (%) |
| | 170(55.19) | 138(44.81) |
| **Father's educational level** | | |
| Primary | 38(22.4) | 34(24.6) |
| High school | 65(38.2) | 48(34.8) |
| Higher educational | 67(39.4) | 56(40.6) |
| **P-value** | 0.03 | |
| **Mother's educational level** | | |
| Primary | 33(19.4) | 33(23.9) |
| High school | 67(39.4) | 47(34) |
| Higher educational | 70(41.2) | 58(42.1) |
| **P-value** | 0.5 | |
| **Father's job** | | |
| Private | 164(96) | 89(64.5) |
| Employee | 126(74) | 49(35.5) |
| **P-value** | 0.04 | |
| **Mother's job** | | |
| Un Employed | 115(67.6) | 73(52.9) |
| Employed | 55(32.4) | 65(47.1) |
| **P-value** | 0.8 | |
| **Income** | | |
| Low | 30(17.7) | 24(17.4) |
| Appropriate | 32(18.8) | 22(15.9) |
| Well | 31(18.2) | 24(17.4) |
| Excellent | 77(45.3) | 68(49.3) |
| **P-value** | 0.2 | |

The children's use of dental floss behavior was significantly related to the Father's job (P = 0.04), Father's educational level (P = 0.03) (Table 2).

**Table3**. Factors predicting brushing behavior at least twice a day among of students

| Brushing behavior | B | Simple OR (95% CI) | P-Value | B | Multiple OR (95% CI) | P-Value |
|---|---|---|---|---|---|---|
| **Mother's educational level** | | | 0.005 | | | 0.108 |
| Primary | 0.16 | 1 (0.40-2.51) | 1.32 | 0.19 | 1.14(0.54-2.65) | 0.26 |
| High school | 0.47 | 1.60(0.92-2.78) | 0.63 | 0.38 | 1.46(0.57-3.78) | 0.02 |
| Higher educational | 0.57 | 1.78(0.66-4.74) | 0.01 | 0.52 | 1.65(0.97-2.83) | 0.01 |
| **Income** | | | 0.008 | | | 0.123 |
| Low | 0.18 | 1.12(0.52-2.63) | 0.12 | 0.15 | 1.01(0.53-1.90) | 0.24 |
| Appropriate | 0.23 | 1.24(1.14-1.38) | 0.18 | 0.20 | 1.13(0.53-2.64) | 0.18 |
| Well | 0.28 | 1.36(0.47-3.68) | 0.02 | 0.25 | 1.18(0.41-2.59) | 0.01 |
| **Self-efficacy** | 0.38 | 1.46(0.57-3.78) | <0.001 | 0.35 | 1.42(1.14-1.76) | 0.012 |
| **Commitment to plan** | 0.18 | 1.13(1.04-1.23) | <0.001 | 0.15 | 1.02(0.36-2.52) | 0.014 |
| **Cues to action** | 0.16 | 1.02(0.23-3.53) | 0.003 | 0.12 | 1 (0.87-1.26) | 0.023 |

OR = odds ratio, CI = confidence interval

Second stage

Using a logistic model for testing, the effect of six structures of HBM and demographic variables having a significant relationship with oral health behaviors. Tables3, 4show the data used in the

231    model. In order to find out the relationship between oral health behavior and independent

232    variables, simple and multiple logistic regression analyses were carried out with five-six

233    structures of HBM and demographic variables that were significant according to Tables 3,

234    Mother's education (P =0.005), income (P =0.007), self efficacy, Commitment to plan (P

235    <0.001) and Cues to action (P =0.003) predicted the students' behavior of Dental floss at least

236    twice a day.

237    However, after adjustment, only perceived self-efficacy, Commitment to plan, Cues to action

238    remained significant, so that one unit increase in perceived self efficacy increased the possibility

239    of teeth Brushing behavior at least twice a day by 1.42 times, Commitment to plan by 1.02 times

240    Cues to action by times.

241    **Table4**. Factors predicting use dental floss behavior at least once a day among of students

| Dental floss behavior | *B* | Simple OR (95% CI) | P-Value | *B* | Multiple OR (95% CI) | P-Value |
|---|---|---|---|---|---|---|
| **Mother's job** | | | 0.006 | | | 0.012 |
| **Father's educational level** | | | 0.004 | | | 0.113 |
| Primary | 0.18 | 1.20(0.54-2.70) | 0.61 | 1.19 | 0.78(0.37-1.69) | 0.23 |
| High school | 0.47 | 1.60(0.92-2.78) | 0.01 | 0.28 | 1.36(0.47-2.68) | 0.01 |
| Higher educational | 2.61 | 0.74(0.33-1.65) | 0.03 | 0.52 | 1.65(0.97-2.83) | 0.01 |
| **Income** | | | 0.007 | | | 0.104 |
| Low | -0.56 | 0.56(0.18-1.72) | 0.31 | 0.45 | 1.31(0.83-2.43) | 0.28 |
| Appropriate | -0.034 | 0.96(0.31-3.01) | 0.95 | 0.20 | 1.15(0.55-2.66) | 0.23 |
| Well | 0.13 | 1.14(0.35-3.65) | 0.81 | 0.21 | 1.12(0.35-2.53) | 0.01 |
| **Self-efficacy** | 0.53 | 1.78(0.66-4.74) | <0.001 | 0.36 | 1.30(0.99-2.34) | 0.016 |
| **Commitment to plan** | 0.18 | 1.13(1.043-1.23) | <0.001 | 0.15 | 0.89(0.38-1.54) | 0.21 |
| **Cues to action** | 0.16 | 1.02(0.23-3.53) | 0.003 | 0.14 | 1.02(0.89-3.44) | 0.002 |

242    OR = odds ratio, CI = confidence interval

243

244    The results showed that the students' use of dental floss behavior was significantly related to the

245    mother's job (P = 0.006), Father's educational level (P = 0.004), income (P =0.007) perceived

246    self efficacy (P <0.001), Commitment to plan (P <0.001), and Cues to action (P = 0.003). When

247    they were separately entered into the model (Table 4) Nevertheless, after adjustment, mother's

248    job (P = 0.012) and self efficacy (P =0.016) were found to be significantly related to the use of

249    dental floss once a day or more.   The increase of perceived self efficacy by one unit, the

250    possibility of using dental floss at least once a day will increase by 1.30 times (OR = 1.30, 95%

251    CI = 0.99-2.34, P = 0.016).

**Discussion**

253    The current survey was designed to investigate the predictors to oral health behaviors are

254    expecting in Iranian students in district 1 Tehran based on the health belief model with added

255    Commitment to plan construct Consistent with this examine findings, other research has

256    mentioned a significant relationship between the education level of mother and father As

257    Aggarwal study[12] Contrary to the Pourhaji study, there was no significant relationship between

258    education level and oral health behaviors the two groups [1], a significant relationship between

259    income, Father's job, dental floss behavior and brushing behavior in students same Phanthavong

260    study[13].

261    This study results indicated that perceived self-efficacy, Cues to action, and Commitment to plan

262    were the significant predicting variables which is the key factor of teeth brushing and Brushing

263    behavior at least twice a day, and use of dental floss and Brushing behavior once a day or more.

264    According to the data, respectively the study carried out by Rahnama et al study[14]and Hazavei

265    study et al[15] showed that self-efficacy, Cues to action had the highest percent of total variance

266    observed in dental health behaviors.

267    But in there was   a constrained correlation between oral health perceptions and elevated

268    perceived benefits in solhi study[16] .Maria et al study on the role of self-efficacy in dental

269    patients' brushing and flossing, found that, barriers emerging, and self-efficacy significantly

270    predicted brushing and flossing behaviors also[17].

271     However, it had no significant relation like the current study with perceived benefits and in

272     contrast to current cues to action[18]. Maybe because of the age range of the participants who were

273     in five-grade age and by gender.

274     Within the charkazi study, besides for perceived barriers (with negative correlation), all

275     constructs of HBM were definitely associated with oral health behaviors. Self-efficacy was the

276     most powerful predictor of oral health behavior[19]. The kasmaei findings recommend that

277     perceived objective severity and perceived psychological barriers play an important position in

278     adopting acceptable health behavior among younger young people[20].

279     Moreover, according to the present study, numerous researches have revealed that commitment

280     to plan has been as the best predictor variable for actual oral health behaviors[19-20]. Therefore,

281     strategies for enhancing commitment to plan   in practice, such as strengthening Self-

282     extinguishing techniques, Enhance commitment, Pursuit of commitment and focus groups

283     discussion could lead to more effective oral health behaviors programs for Iranian students and

284     should be considered in future intervention[21-22]. These programs could propose that highly

285     commitment to plan individuals exert greater efforts to empowering individuals to prevent them

286     from returning to unhealthy behavior[23]. Pender stated that more commitment to plan could have a

287     much impact on continuing health promotion behaviors[24].

288     In this study, the variables of cues to action with a positive relationship were demonstrated to be

289     significant predictors for oral health behaviors among the Iranian students. This finding is

290     supported by many previous studies which found that Cues to action are stimuli that trigger

291     appropriate health behaviors. Cues can be either internal, that is, the perception of bodily states,

292     or external, that is, stimuli from the environment, such as interpersonal interactions or the mass

293     media[25-26]. In the current study, there was also a relationship between Self-efficacy and oral

294   health behaviors. Similar to the present study, Self-efficacy was the most predictive factors of

295   oral health behaviors. These results are consistent with previous studies[27-29].

296   **Limitations**

297   There are several limitations to this study. First, the statistics used on this evaluation were

298   amassed via a cross-sectional design in addition to assessing oral health behaviors as self-report,

299   in which humans typically might record the conduct better than the real amount. Furthermore,

300   this observes changed into based totally on a comfort sample, so that it's locating of this study

301   might not be generalized to all Iranian students groups to evaluate the real rate of behaviors and

302   effective factor on them. Another limitation of this study is that it was performed in the female

303   sex group.

304   **Conclusions**

305   This study has shown the effectiveness of the health belief model with added commitment to

306   plan construct to predict oral health behavior in female students. So, it seems that the model as a

307   framework for designing training programs to improve students to improve oral health behavior

308   can be used. The finding of this study provides needed data assisting the development of model-

309   based behavioral prevention interventions to encourage student's oral health behavior. Cross-

310   sectional design in addition to evaluating oral health behaviors as self-report is another limitation

311   of the study.

312   **Acknowledgement**

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316   **Author contribution**

317    M H D, FP conducted whole study and had full access to all data for analysis.

318    SST, AH, MHD supervised the study and also she was involved in drafting the article

319    SHN verified the data analysis.  All authors confirmed the final version of the manuscript.

320    **Finance/Disclosure**

321    None declared.

322    **Conflict of Interest**

323    "The authors acclaimed that they have no rivaling interests".

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